PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference	FOR FURTHER ACTION See Form PCT/IPEA/416	
AP101506/TA		
International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/FI 2003/000684	19-09-2003	30-09-2002
International Patent Classification (IPC) or national classification and IPC		
G01N21/37, G01J5/42		
Applicant		
NOVELTECH SOLUTIONS LTD ET AL		

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 8 sheets, including this cover sheet.
3. This report is also accompanied by ANNEXES, comprising:
   a. ☐ *(sent to the applicant and to the International Bureau)* a total of _____ sheets, as follows:
      ☐ sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
      ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.
   b. ☐ *(sent to the International Bureau only)* a total of (indicate type and number of electronic carrier(s))
      _____, containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).
4. This report contains indications relating to the following items:
   - ☒ Box No. I Basis of the report
   - ☒ Box No. II Priority
   - ☒ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - ☐ Box No. IV Lack of unity of invention
   - ☒ Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
   - ☒ Box No. VI Certain documents cited
   - ☐ Box No. VII Certain defects in the international application
   - ☐ Box No. VIII Certain observations on the international application

Date of submission of the demand	Date of completion of this report
22-12-2004	21-04-2004
Name and mailing address of the IPEA/SE Patent- och registreringsverket Box 5055 S-102 42 STOCKHOLM Facsimile No. +46 8 667 72 88	Authorized officer Anna Lundqvist /LR Telephone No. +46 8 782 25 00

Form PCT/IPEA/409 (cover sheet) (January 2004)

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ational application No.
PCT/FI 2003/000684

Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ This report is based on a translation from the original language into the following language _____, which is the language of a translation furnished for the purposes of:

- ☐ international search (under Rules 12.3 and 23.1(b))
- ☐ publication of the international application (under Rule 12.4)
- ☐ international preliminary examination (under Rules 55.2 and/or 55.3)

2. With regard to the **elements** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report):*

☒ the international application as originally filed/furnished

☐ the description:

pages _____ as originally filed/furnished
pages* _____ received by this Authority on _____
pages* _____ received by this Authority on _____

☐ the claims:

pages _____ as originally filed/furnished
pages* _____ as amended (together with any statement) under Article 19
pages* _____ received by this Authority on _____
pages* _____ received by this Authority on _____

☐ the drawings:

pages _____ as originally filed/furnished
pages* _____ received by this Authority on _____
pages* _____ received by this Authority on _____

☐ a sequence listing and/or any related table(s) – see Supplemental Box Relating to Sequence Listing.

3. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages _____
- ☐ the claims, Nos. _____
- ☐ the drawings, sheets/figs _____
- ☐ the sequence listing *(specify)*: _____
- ☐ any table(s) related to the sequence listing *(specify)*: _____

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

- ☐ the description, pages _____
- ☐ the claims, Nos. _____
- ☐ the drawings, sheets/figs _____
- ☐ the sequence listing *(specify)*: _____
- ☐ any table(s) related to the sequence listing *(specify)*: _____

* *If item 4 applies, some or all of those sheets may be marked "superseded."*

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Box No. II Priority

1. ☐ This report has been established as if no priority had been claimed due to the failure to furnish within the prescribed time limit the requested:

   ☐ copy of the earlier application whose priority has been claimed (Rule 66.7(a)).

   ☐ translation of the earlier application whose priority has been claimed (Rule 66.7(b)).

2. ☐ This report has been established as if no priority had been claimed due to the fact that the priority claim has been found invalid (Rule 64.1). Thus for the purposes of this report, the international filing date indicated above is considered to be the relevant date.

3. Additional observations, if necessary:

The priority claimed is considered valid. Therefore, document US 6474168 B1 remains as a P, X-document.

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Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non obvious), or to be industrially applicable have not been examined in respect of:

☐ the entire international application

☒ claims Nos. 6-10, 14-15

because:

☐ the said international application, or the said claims Nos. _____ relate to the following subject matter which does not require an international preliminary examination *(specify)*:

☐ the description, claims or drawings *(indicate particular elements below)* or said claims Nos. _____ are so unclear that no meaningful opinion could be formed *(specify)*:

☐ the claims, or said claims Nos. _____ are so inadequately supported by the description that no meaningful opinion could be formed.

☒ no international search report has been established for said claims Nos. 6-10, 14-15

☐ the nucleotide and/or amino acid sequence listing does not comply with the standard provided for in Annex C of the Administrative Instructions in that:

the written form
- ☐ has not been furnished
- ☐ does not comply with the standard

the computer readable form
- ☐ has not been furnished
- ☐ does not comply with the standard

☐ the tables related to the nucleotide and/or amino acid sequence listing, if in computer readable form only, do not comply with the technical requirements provided for in the Annex C-*bis* of the Administrative Instructions.

☐ See Supplemental Box for further details.

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Box No. V **Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N)	Claims	1-5, 11-13	YES
	Claims		NO
Inventive step (IS)	Claims		YES
	Claims	1-5, 11-13	NO
Industrial applicability (IA)	Claims	1-5, 11-13	YES
	Claims		NO

2. Citations and explanations (Rule 70.7)

This application discloses a photo-acoustic detector comprising a first chamber with the gas to be analyzed, a window for letting infrared light in the first chamber and means for detecting pressure variations by contactless measurements of the movement of a door, situated in the wall of the first chamber.

Reference is made to the following documents:
D1: US 6222190 B1
D2: EP 0389071 A2
D3: US 4557603 A
D4: US 6082178 A
D5: US 4355234 A

Document D1 discloses a photo-acoustic infrared detector including a chamber for receiving a gas, a window for allowing pulsed or modulated IR radiation into the chamber, and a pressure sensor adapted to measure pressure changes in the chamber as a consequence of absorbed IR radiation. In order to generate a measuring signal corresponding to the membrane oscillations resulting from pressure changes in the chamber, various sensor principles can be contemplated, e.g. a piezo-resistive or capacitive measurement principle. The light reflected internally in the chamber coating goes back and out through the window. Except for the inside of the window, it appears from the drawing that the internal chamber is coated with a reflective aluminium coating, whereby such a reflecting layer covers at least the internal surface portion of the sensor, which is constituted by a membrane. There is a venting channel where the desired gas mixture enters the chamber. See

.../...

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.
Continuation of: Box V

column 1, line 66 - column 2, line 10, figure 1 and the abstract.

Document D2 discloses a pressure transducer having an ultra thin tensioned silicon diaphragm so as to be responsive to extremely small changes in pressure for converting light to electrical signals. The transducer includes a device that has a pair of spaced apart conductive plates and defining capacitor plates, and a flexible diaphragm or membrane. A first capacitance C1 exists between the capacitor plate and the diaphragm. In like manner, a second capacitance C2 exists between the capacitor plate and the diaphragm. When the diaphragm deflects the capacitance C1 decreases, while the capacitance C2 increases, thereby generating a differential capacitance relationship. An electrical circuit has inputs connected by conductors to the capacitor plates as well as to the diaphragm. The circuit is responsive to the change in capacitances C1 and C2 to provide an output voltage which comprises a voltage having a linear relationship with the pressure. Holes are formed through the glass substrates to allow gases or liquids to apply a pressure on the diaphragm. See page 3, lines 21 - 24; page 3, lines 29 - 33; page 5, line 41 - page 6, line 3; page 6, lines 20 - 24 and figure 1.

Document D3 discloses an optical detection system for selectively detecting gases, comprising a light source emitting light thermally or mechanically modulated and supplied to a measuring cell. See column 2, line 64 - column 3, line 6; column 15, lines 19 - 29.

Document D4 discloses a photo-acoustic detector including a chamber for receiving the gas, a path for pulsed or modulated IR radiation into, through and out of the chamber, and a pressure sensor adapted to measure pressure changes in the chamber caused by the applied IR radiation. See column 1, lines 36 - 42 and abstract.

Document D5 discloses a double beam infrared analyzer modulated to separately and alternately project the sample beam and comparison beam into a condenser microphone type detector thereby generating alternate pulsed signals indicating the intensity of the sample beam and comparison beam. See column 2, lines 37 - 44.

.../...

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.
Continuation of: Box V

The photo-acoustic infrared detector described in D1 is considered to represent the most relevant prior art. The invention according to claims 1 and 11 differs from this technique in that the membrane is moveable. A person skilled in the art facing the problem of detecting the pressure difference which gives rise to a change in volume in a chamber knows from D2 to use a moveable membrane. If the person skilled in the art modifies the closest prior art according to the instructions in D2, he will reach the invention as defined in claims 1 and 11. Since the prior art belongs to the same technical field and solves the same problem with the same construction, it is considered obvious for a person skilled in the art to apply this technique. The invention according to claims 1 and 11 is therefore considered to lack an inventive step.

What is described in claims 2-5 and 12-13, such as the door area being equal to the aperture in the chamber, that the door and the frame are fabricated from silicon, that the sensor does not comprise sensors fixedly mounted thereon, is considered to show details already mentioned in D1-D5 or obvious for a person skilled in the art. Therefore, the technique described in claims 2-5 and 12-13 lacks an inventive step.

The invention is industrially applicable.

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[redacted]ational application No.
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Box No. VI Certain documents cited

1. Certain published documents (Rule 70.10)

Application No. Patent No.	Publication date *(day/month/year)*	Filing date *(day/month/year)*	Priority date (valid claim) *(day/month/year)*
US 6474168 B1 P,X	05-11-2002	25-11-1998	26-11-1997

2. Non-written disclosures (Rule 70.9)

Kind of non-written disclosure	Date of non-written disclosure *(day/month/year)*	Date of written disclosure referring to non-written disclosure *(day/month/year)*